bearing pad, the bending of the sole plate, and cracking and failure of the bent cap around the anchor bolt. It should be noted that POT and TFE bearing pads are not included in this investigation as NCDOT does not use a diaphragm to connect adjacent girders with these types of bearings.

xvi. In the longitudinal direction, without a diaphragm and continuity of the deck, such connections will not transfer moment, and a K factor for buckling analysis of 2.1 is deemed appropriate. However, when a diaphragm and bearing pad is present, it has been shown that, using the method for estimating k in Robinson et al. (2006) with the equivalent length from a fixed head analysis, the k value can be reduced if a rotational spring simulating the sub to super structure connection is modeled at the top of the pile in the single lateral pile analysis. As the rotational stiffness increases, the K factor will decrease from 2.1 down toward the value for a fixed head.

xvii. NCDOT currently assumes a K value of 1.4, which indicates the fixity of the connection. It should be noted that, in the transverse direction, such an assumption seems to be valid, and no investigation is focused on the behavior in the transverse direction.

xviii. It can also be concluded that a conservative estimate of yield displacement, that can be used as a design limit state, can be easily calculated with Equation 18 and Equation 19 for free head and fixed head response respectively. The yield displacement is directly proportional to the square of the equivalent length and inversely proportional to the diameter of the section. For the seven bridges studied (three in this report and four in the previous), the yield displacement calculated by equations and by pushover analyses are higher than the one inch design limit generally used by the NCDOT.

xix. The resistance factors for laterally and axially loaded drilled shaft are developed based on limited test data from sites in North Carolina. The